PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of

Chang et al. (SANDP039)	Conf. No. 8920
Serial No. 10/679,000	Group Art Unit: 2186
Filed: October 2, 2003	Examiner: Tsai

For: Method and Apparatus for Managing the Integrity of Data in Non-volatile Memory System

APPELLANTS' REPLY BRIEF

Commissioner for Patents
Washington, DC 20231

Dear Sir:

Appellants respectfully present their Reply Brief in response to the Examiner's Answer mailed February 13, 2008.

Appellants stand by their arguments as presented in the Amended Appellants' Brief filed January 28, 2008. This Reply Brief responds to certain points of argument presented in the Examiner's Answer, which were in response to Appellants' arguments in their main Brief.

Argument in response to the Examiner's Answer

Regarding the double patenting rejection

Appellants maintain that the provisional double patenting rejection of claims 1, 3, 4, 6, 7,10, 11, 15, 21, 23, 27, and 28 is in error, and should be reversed, for the reasons stated in their main Brief. As mentioned above, Appellants will respond, in this Reply Brief, to certain points

of argument raised in the Examiner's Answer, upon which the final rejection on this basis is maintained.

The Examiner responded to Appellants' argument in this point by again asserting that the double patenting rejection is valid because claim 4 in copending application S.N. 10/678,893 is narrower than claim 1, and that therefore this claim 4, with its narrower scope, reads on and teaches the claim with the broader scope.[1] The Examiner bolsters this conclusion by pointing out how a particular limitation of claim 4 ("meeting a criterion") of the copending application is not present in rejected claim 1 in this application, from which the Examiner concludes that the "scope of claim 4 of application 10/678,893 is narrower than that of claim 1 of application 10/679,000".[2]

Appellants submit that the Examiner is using an incorrect test for determining whether one claim is narrower in scope than another. Based on the content of the Examiner's Answer,[3] the test used by the Examiner is whether one claim contains more limitations than the other regarding a particular feature of the alleged broader claim; claim 4 of the copending application "contains more limitations specifying how segment/block 1 and segment/block 2 are to be determined" than does claim 1 on appeal in this case, and therefore this claim 4 is narrower. Appellants submit that this approach is not consistent with the case law, and in fact is not determinative of whether one patent claim is narrower than another.

The determination of whether one patent claim is narrower than another is of course important in determining whether a claim presented in reissue is narrower than a claim as granted.[4] In that context, the courts have applied a test that determines whether subject matter within the scope of an amended or newly added claim in the reissue application would not have infringed the original patent; if so, the reissue claim is broader than the patent claims.[5] In other words, if a first claim reads on a method or apparatus that another claim does not read on, the first claim is broader than the other claim. Furthermore, "evidence that a single device infringes

---

[1] Examiner's Answer of February 13, 2008, page 20.
[2] *Id.*
[3] Examiner's Answer, *supra,* pages 4 through 8 (especially "EXPLANATION" on page 8), and 20.
[4] 35 U.S.C. §251.
[5] *Tillotson Ltd. v. Walbro Corp.,* 831 F.2d 1033, 4 USPQ2d 1450 (Fed. Cir. 1987); MPEP §1412.03.

both the original and new claims has little bearing on whether the new claims embrace any conceivable apparatus which would not have infringed the original patent".[6] Appellants submit that this approach is also the legally correct approach in determining, in this case and for purposes of the double patenting determination,[7] whether claim 4 in copending application S.N. 10/679,893 is narrower than claim 1 on appeal.

However, the Examiner does not apply this test in his determination that claim 4 in the copending application is narrower than claim 1 in this case, in making and maintain the double patenting rejection. Nowhere does either the final rejection or the Examiner's Answer anywhere analyze the scope of claims 4, 6, or 9 in the copending application to determine whether those claims cover any method that falls outside of the scope of claim 1 in this application, or any apparatus that falls outside of the scope of claims 11 or 23 in this application. This question, which is essential to the stated basis double patenting rejection, is neither asked nor answered in the analysis presented by the Examiner. For this reason, Appellants submit that the basis for the double patenting rejection of the claims on appeal in this case is legally insufficient, and is therefore in error.

Appellants further submit that claims 4, 6, and 9 of the copending application are in fact not narrower than the independent claims on appeal in this application. Independent claim 1 on appeal in this application requires, *inter alia*, the steps of:

> dividing at least a part of the page into at least a first segment and a second segment;
> encoding data associated with the first segment according to a first error correction code (ECC) algorithm;
> encoding data associated with the second segment according to a second ECC algorithm . . . .

In order for claim 4 of the copending application to be narrower than claim 1 on appeal in this application, the practice of the method of claim 4 must necessarily also be within the scope of this claim 1. As asserted in their main Brief, Appellants submit that the claim term "page" of

---

[6] *In re Self,* 671 F.2d 1344, 1347, 213 USPQ 1 (CCPA 1982).

[7] Appellants submit, of course, that whether one claim is narrower than another is not determinative of the question of double patenting of the obviousness type. However, the final rejection on grounds of double patenting, as asserted by the Examiner, is based on this determination, which Appellants find to be in error for the reasons stated.

claim 1 is different from the claim term "block" in claim 4 of the copending application: specifically, Appellants submit that the term "page" refers to the smallest unit of programming, while the term "block", as used both in the copending application and in this application, refers to the smallest unit of erase, with a "block" containing multiple "pages".[8] If one accepts that the terms "page" and "block" mean two different things, it is then beyond question that one can practice the method of claim 4 of the copending application outside of the scope of claim 1 on appeal in this case, because claim 4 of the copending application nowhere mentions the treatment of pages within its first and second blocks, much less the dividing of such a page into first and second segments into which data encoded according to different ECC algorithms are programmed.

The Examiner asserts, however, that the terms "page", "sector", "segment", "block", or "bit" can all refer to the smallest unit of programming in a flash memory. Appellants dispute this assertion, for the reasons stated in their main Brief.[9] However, even under the Examiner's faulty interpretation of the terms "page" and "block" as interchangeable, the method of claim 4 is not within the scope of claim 1 in this application. As noted above, by its express language, claim 1 in this application requires the dividing of a "page" into first and second "segments", with the data programmed into those segments having been encoded according to different ECC algorithms. No such dividing is required to carry out the method of claim 4 of the copending application, even if one considers[10] a "page" and "block" to mean the same thing. Rather, claim 4 of the copending application reads:

> 4. A method for storing data within a non-volatile memory comprised of a plurality of blocks in an array formed on a semiconductor substrate, each of the plurality of blocks having an indicator indicative of whether the block is a reclaimed block, the method comprising:
>
> identifying a first block of the plurality of blocks into which the data is to be stored;
>
> responsive to the indicator associated with the first block meeting a criterion, encoding the data using a first error detection algorithm;
>
> then writing the encoded data into the first block;

[8] Appellants' Brief of January 28, 2008, pages 5 through 8.
[9] *Id.*
[10] Albeit erroneously.

identifying a second block of the plurality of blocks into which data is to be stored;

responsive to the indicator associated with the second block not meeting the criterion, encoding the data using a second error detection algorithm, the second error detection algorithm having a higher error detection capability than the first error detection algorithm; and

then writing the encoded data into the second block.

As evident from this claim language, data written to a block is encoded according to a first or second error detection algorithm based on whether that block's indicator indicates that the block is reclaimed. Again, even if one considers[11] the "block" of this claim to mean the same thing as a "page" of claim 1 on appeal, this claim 4 from the copending application nowhere requires dividing such a "block/page" into segments and encoding the data differently for those segments. One can practice the method of claim 4 of the copending application by encoding data for a first block entirely according to a first ECC algorithm, and encoding data for a second block entirely according to a second ECC algorithm. In other words, one can practice the method of claim 4 of the copending application without performing the dividing step required by claim 1 on appeal in this case.

For these reasons, Appellants maintain and again submit that the Examiner's determination that claim 4 of the copending application is narrower than claim 1 on appeal in this application is in error. And because the final double patenting rejection of claim 1 and its dependent claims is grounded on that determination, Appellants therefore submit that the rejection, on its own terms, is in error and should be reversed.

Similarly, Appellants submit that claims 6 and 9 in the copending application are not narrower than claim 1 on appeal in this application. Claim 6 in the copending application[12] nowhere mentions the claim term "page", but rather refers only to whether data are encoded according to a first or a second algorithm for a block based upon the value of an indicator for that block. Appellants submit that because the claim terms "page" and "block", properly interpreted, refer to different functional units of a memory in both cases, and because claim 6 in the copending application nowhere recites any operation on a "page", much less the dividing,

[11] Albeit erroneously.

[12] And its dependent claim 9, also asserted in this rejection.

encoding, and programming steps of claim 1, one can practice the method of claims 6 and 9 of the copending application outside of the scope of claim 1 on appeal in this case.

And also, similarly as discussed above, even if one erroneously interprets the claim terms "page" and "block" to mean one and the same thing,[13] Appellants submit that claims 6 and 9 would also not be narrower than claim 1 on appeal in this case. According to this claim 6 also, data written to a block is encoded according to a first or second error detection algorithm based on whether that block's indicator indicates that the block is reclaimed. The claim nowhere mentions, much less requires, the dividing of such a "block" into portions, much less encoding data differently for those portions within such a block. Again, one can practice the method of claim 6 of the copending application by encoding data for a first block entirely according to a first ECC algorithm, and encoding data for a second block entirely according to a second ECC algorithm. Accordingly, one can thus practice the method of claims 6 and 9 of the copending application without performing the dividing step required by claim 1 on appeal in this case.

Appellants therefore maintain and again submit that the Examiner's determination that claims 6 and 9 of the copending application are narrower than claim 1 on appeal in this application is in error. And because the final double patenting rejection of claim 1 and its dependent claims is grounded on that determination, Appellants therefore submit that the rejection, on its own terms, is in error and should be reversed.

Appellants further submit that independent claims 11 and 23 are also not necessarily met by a memory system that practices the methods recited in claims 4, 6, and 9 of the copending application. Those independent claims 11 and 23 require code devices or means, respectively, for dividing at least part of a page into at least two segments, and respective code devices and means for encoding data associated with first and second segments within such a divided page according to first and second ECC algorithms, respectively. For the reasons discussed above, whether one properly interprets the claim terms "block" and "page" to mean different things or if instead one erroneously interprets these claim terms to mean the same thing,[14] one can readily practice the methods of claims 4, 6, and 9 of the copending application with a memory system

[13] As asserted by the Examiner.
[14] As does the Examiner.

that does not involve such code devices or means. This is because one can practice the methods of claims 4, 6, and 9 without dividing its blocks, or pages, into segments and encoding data differently into those segments.

Appellants therefore maintain that the stated basis for the double patenting rejection of the claims on appeal is in error as a matter of law. No other basis, valid or otherwise, for this double patenting rejection is asserted by the Examiner. Appellants therefore respectfully maintain that the double patenting rejection of claims 1, 3, 4, 6, 7, 10, 11, 15, 21, 23, 27, and 28 is in error, and should be reversed.

Regarding the §103 prior art rejections

Appellants maintain that the final rejection, under §103, of independent claims 1, 11, and 23, and their respective dependent claims as unpatentable over the Bassett et al. reference[15] in view of the Katayama et al. reference[16], is in error and should be reversed, for the reasons stated in their main Brief.

In this Reply Brief, Appellants will respond to points of argument raised in the Examiner's Answer in response to Appellants' main brief.

In their main Brief, Appellants urged that the Examiner failed to establish a *prima facie* case of obviousness relative to claim 1, because there is no valid reasoning articulated by the Examiner to apply the teachings of the Bassett et al. reference to a flash memory, and thus in such a manner as to reach the claims. More specifically, the teachings of the Katayama et al. reference asserted by the Examiner as providing such suggestion arise from a misinterpretation of the Katayama et al. reference. In response to this argument, the Examiner asserted, *inter alia,* that the alleged suggestion to combine these teachings, upon which the final rejection is based, is proper because:

> i. The teachings of the Bassett et al. and Katayama et al. teachings are "closely related to each other" and "would benefit from each other's techniques".[17]

[15] U.S. Patent No. 6,747,827 B1, issued June 8, 2004 to Bassett et al.
[16] U.S. Patent No. 6,651,212 B1, issued November 18, 2003 to Katayama et al.
[17] Examiner's Answer, page 22.

ii. The ECC algorithms disclosed in the Bassett et al. references and the Katayama et al. references are general ECC algorithms known in the art that can be applied to digital data regardless of where it is stored.[18]

iii. The same rationale disclosed by Bassett et al. in applying different ECC algorithms to different sections of data depending on the "need" of each sector can be generalized such that the same approach can be followed in the flash memory of Katayama et al.[19]

The same arguments were raised by the Examiner in response to Appellants' arguments regarding each of independent claims 1, 11, 23 and their respective claims.[20]

Appellants disagree with each of these points, as will now be discussed. The following discussion in this Reply Brief will apply to each of Appellants' separate arguments relative to the independent claims 1, 11, and 23 in their original Brief, such arguments maintained by Appellants in this Reply Brief.

i. The "closely related" teachings of Bassett et al. and Katayama et al.

The Examiner again asserts that the teachings of the Bassett et al. and Katayama et al. references are combinable, in such a manner as to reach the independent claims, because the teachings of the references are "closely related" and because each approach would benefit from the others' teachings. Appellants submit, however, that this conclusion by the Examiner skips an important step in the analysis: namely, a finding that the Katayama et al. reference supplies a teaching that is missing from the Bassett et al. reference.

The final rejection is based on a finding that the Bassett et al. reference teaches the application of different ECC algorithms to different sectors in a disk drive memory. Accordingly, the Bassett et al. reference falls short of the independent claims in this case by not teaching the use of different ECC algorithms to different locations in a non-volatile flash memory.

The Examiner now admits, for the first time, that the Katayama et al. reference does not teach applying different ECC algorithms to different blocks of data, in its flash memory.[21]

[18] Examiner's Answer, pages 22 and 23.
[19] Examiner's Answer, page 23.
[20] Examiner's Answer, pages 22 and 23; pages 25 through 27; pages 29 and 30.
[21] Examiner's Answer, page 24.

Appellants submit, and the Examiner now apparently agrees, that the Katayama et al. reference instead teaches the application of two different ECC algorithms sequentially to the same data. [22]

The Examiner now asserts the Katayama et al. reference as merely teaching the element of "flash memory".[23] However, Appellants again submit that this mere asserted teaching of the existence of flash memory, in the prior art, falls short of any suggestion or motivation to apply the teachings of the Bassett et al. reference to a non-volatile flash memory device, as claimed. The absence of such suggestion is apparent from the reasons stated in the Bassett et al. reference for using two different ECC algorithms to different sectors of the disk, for example:

> According to a preferred embodiment of the invention, it is observed that the need for error correction in many applications depends on the frequency and duration of soft errors, which, in turn, may depend upon the radial position of a given sector. Thus, two of the salient aspects of the invention are the need for an ECC for the duration and, frequency of soft errors and the need for an ECC for a given radial location. As a result of this observation, it can be seen that the ability to apply a different ECC strategy to different data types could result in more efficient utilization of the disk's storage capacity. Broadly, the selection of an ECC strategy can be accomplished by selecting an ECC algorithm that encodes and decodes the data in a certain way. The particular selection of interest herein are the speed of decoding and the number of ECC bits required to be associated with each data group or frame.
>
> More particularly, for instance, some types of soft errors encountered in a sector may be dependent on the radial position of the sector. It has been observed that over time small particles that create soft errors may migrate to the outside diameter (OD) of the disk **12** through the centrifugal force created by the spinning disk. The particulate on a disk media can be of two kinds. The first are those that stick to the disk at some location and stay there. The second are those that move around, due to turbulence and the centrifugal force of the spinning disk. The former are detected by the read channel during drive burn-in, or certification by a scanning algorithm. Those areas of the disk with identified debris (defects) may be skipped, or ignored as usable space on the disk, depending upon the severity (bit length) of the defect.
>
> The particles that move about tend to move toward the OD. These particles cause thermal asperity (TA) events when the MR read head impacts with a particle. The MR head experiences a stressed condition from the Joule heating caused by the collision with a particle. The effect is temporary and the head soon cools and

[22] Katayama et al., *supra,* column 10, lines 51 through 56.
[23] Examiner's Answer, page 22.

> returns to its normal signal output level. During the TA event the probability of errors induced in the data stream increases substantially.
>
> Thus, a more powerful ECC capability is desired in those radial regions that have a higher concentration of particulate and thus a higher probability of a TA event, typically toward the OD. Less powerful ECC capability may be acceptable in those regions of less dense particulate, typically toward the ID.[24]

Other reasons stated in the reference for choosing different ECC capability for different locations of a magnetic disk include electronic noise, which is "a function of factors such as temperature, resistance, and frequency", and which the reference relates to physical characteristics of the disk medium.[25] The reference goes on to then teach the use of stronger ECC in regions of the disk toward the inside diameter ("ID").[26] Each of these stated reasons for the use of different ECC algorithms are linked directly to the physical attributes and construction of a magnetic disk drive, and have no relation to a non-volatile flash memory.

The generic language of the Bassett et al. reference regarding other reasons why one might apply different ECC algorithms to different locations of the memory[27] provides no motivation to apply these teachings in memories other than disk drive memories. This is because the error mechanisms addressed by the Bassett et al. reference all directly result from the specific physical attributes of magnetic disk media.

Therefore, if the Katayama et al. reference is now "only relied on to teach the element of 'flash memory'",[28] Appellants submit that this limited application of the reference is insufficient to render the independent claims unpatentable. The Katayama et al. reference provides no motivation to the skilled reader why one might use different ECC algorithms in different physical locations of a non-volatile flash memory. Only through the hindsight use of Appellants' own teachings would one make this combination and modification of the Bassett et al. teachings.

---

[24] Bassett et al., *supra,* column 4, line 37 through column 5, line 14.
[25] Bassett et al., *supra,* column 5, lines 26 through 34.
[26] Bassett et al., *supra,* column 5, lines 52 through 57.
[27] Bassett et al., *supra,* column 7, lines 24 through 37 (" For example, different error correcting codes of different strengths may be applied on a sector-by-sector basis, or on some other basis, depending upon the particular application, data types involved, and so forth."
[28] Examiner's Answer, page 24.

Appellants therefore maintain and again submit that the alleged application of the teachings of the Bassett et al. reference to a flash memory is not based on an articulation of valid reasoning, with at least some rational and valid underpinning, as is required to support a §103 rejection.[29] Appellants therefore submit that the final rejection of the claims on appeal is in error because the Examiner has failed to present a *prima facie* determination of obviousness of those claims. Reversal of the final rejection is requested.

ii. The ECC algorithms disclosed in the Bassett et al. references and the Katayama et al. references are general ECC algorithms known in the art

The Examiner supports the final rejection, and responds to Appellants' previous arguments, by asserting that the ECC algorithms disclosed by the Bassett et al. and Katayama et al. references are general ECC algorithms that are well known in the art, and can be applied to digital data regardless of whether such data is stored in a disk or in a flash memory.[30]

Appellants do not dispute this assertion. However, this assertion supplies no motivation for modifying the teachings of the Bassett et al. reference so as to reach the claims in this case. This is because the knowledge of the existence and operation of the ECC algorithms taught by the references does not give any insight into *why* the skilled reader would apply the teachings of Bassett et al. to a non-volatile flash memory. As asserted previously, Appellants submit that the reasons stated in the Bassett et al. reference for using different ECC algorithms are due to physical attributes and artifacts that are specific to and within the context of magnetic disks.

Therefore, even though the ECC algorithms of the reference are general ECC algorithms known in the art, this fact lends no motivation to modify or combine the Bassett et al. and Katayama et al. references so as to reach the claims in this case.

---

[29] *KSR International Co. v. Teleflex Inc et al.*, 550 U.S. _____; 127 SCt 1727; 167 L.Ed.2d 705; 82 USPQ2d 1385 (2007).

[30] Examiner's Answer, pages 22 and 23.

iii. The rationale disclosed by Bassett et al. in applying different ECC algorithms to different sections of data depending on the "need" of each sector can be generalized such that the same approach can be followed in the flash memory of Katayama et al.

Finally, the Examiner asserts that the rationale for applying different ECC algorithms to different sections of a disk drive, as taught by Bassett et al., can be "generalized" to an approach suitable for use in a non-volatile flash memory, such as that taught by the Katayama et al. reference.[31]

Perhaps one could so "generalize" this rationale, at least theoretically or for purposes of argument. However, such a generalization of the Bassett et al. teachings to depending on the "need" of each sector cannot be properly be done, for purposes of §103 analysis, using Appellants' teachings in hindsight. Rather, a *prima facie* obviousness determination of patent claims requires the articulation of reasoning, with some rational underpinning, supporting the conclusion that one skilled in the art would have combined or modified the known elements to reach the claimed subject matter. [32] In such a determination based on the combination of prior art references, there must be some suggestion or motivation to combine these references, beyond a mere conclusory statement, to avoid a conclusion that the combination is simply an improper use of the inventor's own teachings in hindsight.[33]

Appellants submit that the Examiner's alleged "generalization" of the "rationale" of the Bassett et al. reference lacks sufficient rational underpinning to avoid the conclusion that the alleged combination of the references is the hindsight use of Appellants' own teachings to make the rejection. The final rejection therefore cannot be sustained on this basis.

---

[31] Examiner's Answer, page 23.
[32] *KSR, supra.*
[33] *KSR, supra; In re Dembiczak,* 175 F.3d 994, 999, 50 USPQ3d 1614 (Fed. Cir. 1999) ("Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability -- the essence of hindsight.").

In conclusion

For the reasons stated in this Reply Brief, Appellants submit that the additional remarks made in the Examiner's Answer do not support the final rejection of the claims in this case. For these reasons, in addition to those presented in Appellants' main Brief, Appellants maintain that the final rejection under §103 of claims 1 through 25, and 27 through 31 is in error.

Reversal of the final rejection of the claims in this case is therefore respectfully requested.

Respectfully submitted,
/Rodney M. Anderson/
Rodney M. Anderson
Registry No. 31,939
Attorney for Appellants

Anderson, Levine & Lintel, L.L.P.
14785 Preston Road, Suite 650
Dallas, Texas 75254
(972) 664-9554